

## **REMARKS**

### **A. Request for Suspension Under 37 C.F.R. § 1.103(c)**

Applicants hereby request suspension of action by the Office for a period of three months as provided by 37 C.F.R. § 1.103(c). Pursuant to the requirements under § 1.103(c), this request is accompanied by a Request for Continued Examination and the fees required under 37 C.F.R. § 1.17(e) and 1.17(i). The Applicants contemplate submission of additional evidence, *e.g.*, in the form of a Rule 132 declaration, during the period of suspension.

### **B. Status of the Claims**

Claims 1-83, 86 and 93 were previously cancelled. New claim 108 has been added and claims 85, 87, 90, 91 and 95 have been amended to correct minor typographical errors. Support for claim 108 can be found, at least in Table 6 on page 30 and in Table 2 on page 20 of the specification. Thus, claims 84-85, 87-92 and 94-108 are currently pending in the case.

### **C. Replacement Inventor Declarations**

Newly executed inventor declarations that correctly identify the application number and filing date for this case, signed by each inventor, are included herewith. The entry of the declarations into the record pursuant to 37 C.F.R. §1.67 is requested. The named inventors are unchanged.

### **D. Rejections Under 35 U.S.C. § 112, First Paragraph Should be Withdrawn**

Although the current claims are directed to a method, the written description rejection focuses on the genus of novel substrate peptides that are used in the method. (The Examiner appears to accept that there is adequate support for the methods steps *per se*, apart from the genus of substrate peptides.) Hence, the arguments here are limited to written description of the peptide substrates.

**1. The specification shows that the Applicants were in possession of the invention at the time of filing.**

At page 10 of the final action the Examiner observes that Table 6 in the specification effectively discloses 9,870,400 substrate permutations, and incorrectly asserts that the Applicants "selectively trimmed their own genus down by an order of  $10^6$ " based on what others have discovered.

The Applicants were in possession of the claimed invention at the time of filing. First, Table 6 and the comparable text at p. 5 of the application provide explicit basis for claiming *every single one* of the 9,870,400 peptide permutations defined by the table, individually or as any subgenus. A person provided only with page 30 of the application (which contains Table 6) could write the amino acid sequence of each one of these 9,870,400 different peptides. The Applicants' depiction of the 9,870,400 peptides in Table 6 satisfies the "conciseness" requirement of 35 USC §112, ¶1 better than listing them individually, but the table still provides basis for claiming every peptide individually. The Applicants explicitly state at the bottom of page 13 of the application that they contemplate all embodiments of the invention narrower in scope in any way than the variations specifically mentioned in the summary, thereby providing additional support for subgenus or species claims. If, after the filing date, others "discovered" *substrate properties* of some of the Applicants' peptides, as suggested by the Examiner, these "others" have done nothing more than copy or independently confirm substrate properties of peptides first described by the current Applicants. The Examiner is mistaken to allege that the reverse is true.

In addition to the foregoing, the specification contains explicit support for the subgenus of the current claims. First, the original and current independent claims define with particularity two residues on either side of the scissile bond, namely positions P<sub>2</sub>, P<sub>1</sub>, P<sub>1</sub>' and P<sub>2</sub>'. (Dependent claims in the original and current claim set further define surrounding positions, *e.g.*, P<sub>4</sub>, P<sub>3</sub>, P<sub>3</sub>', and/or P<sub>4</sub>'.) Thus, the Applicants did not engage in post-filing "trimming" by focusing on these four residues, rather than those more distant from the scissile bond and less important to cleavage. The number of permutations in Table 6 *for the four residues in question* is only 2940 ( $10 \times 6 \times 7 \times 7$ ), not 9,870,400, as asserted by the Examiner. The allegation of 1/1,000,000 "trimming" is plainly incorrect.

The specification also provides explicit support for the subgenus of nine peptide core sequences defined by current claim 84: a peptide comprising the sequence P<sub>2</sub>P<sub>1</sub>-

P<sub>1</sub>P<sub>2</sub>, wherein P<sub>2</sub> is N; P<sub>1</sub> is Y, L and F; P<sub>1</sub> is E, A or D; and P<sub>2</sub> is V. The specification teaches that:

In the peptides of the present invention that were effective Hu-Asp2 [human aspartyl protease] substrates, Tyr/Phe [Y/F] and L were the most abundant amino acids at the P<sub>1</sub> site; Asn [N] appeared several times at the P<sub>2</sub> site; Glu, Asp, and Ala [E, D, and A], were prominent in the P<sub>1</sub>; Val [V] occurred frequently in the P<sub>2</sub>... [Page 19, paragraph 2]

Thus, the application clearly and explicitly contemplates the specific peptide subgenus recited in the claims.

**2. The Rejection incorrectly asserts that the claims encompass a significant number of inoperative substrates.**

At page 11 the Final Rejection asserts that the current scope of the claims does not meet the standard set forth in *Atlas Powder*, an opinion in which the Federal Circuit observed that it is not a function of the claims to specifically exclude possible inoperative embodiments, the question of undue experimentation depending upon whether the number of inoperative embodiments becomes significant. The Examiner specifically asserts that the application fails to support claims concerning substrate peptides wherein P<sub>1</sub> is F. (Final action p. 6.)

First, even if the claims encompass almost 10 million peptide permutations, as alleged by the Examiner, this genus is not large in the context of high throughput screening techniques that were common in the fields of chemistry and molecular biology at the time the application was filed. Indeed, Patent Office precedent for cases involving biological molecules teach that a single disclosed species is often an adequate description of a large genus of polypeptide or polynucleotide molecules defined by appropriate structural limitations and an activity limitation. The Patent Office routinely allows claims that recite genera of biological macromolecules many orders of magnitude larger than any genus at issue here (whether nine or 9,870,400), based on fewer working examples than are present here.

Second, claim 84 explicitly specifies that "the substrate is cleaved between P<sub>1</sub> and P<sub>1</sub>' by [the protease]." This activity limitation for the peptide is consistent with guidance for claiming that is found in the PTO's Written Description Training Materials, and it assures

that the claim encompasses zero inoperative embodiments. (The application also teaches activity assays that can be used to confirm cleavable substrates through routine screening.)

Third, the record contains substantial evidence that most of the nine core sequences recited in the claims are cleaved by the protease. According to the United States Patent and Trademark Office Revised Interim Written Description Guidelines, the specification provides an adequate written description of a genus if a *representative* number of species are implicitly or explicitly disclosed. Clearly, all members of the claimed genus are explicitly disclosed in the application. Furthermore, the application exemplifies the functionality of a representative number of the species in the genus. Specifically, the application demonstrates that five peptides within the claimed genus SEQ ID NO: 5 (NYEV), SEQ ID NO: 133 (NLEV), SEQ ID NO: 7 (NYAV), SEQ ID NO: 46 (NYDV) and SEQ ID NO: 47 (NLAV) are cleaved by an aspartyl protease.

The Examiner alleges that the definition of P<sub>1</sub> as F is not adequately supported because it is not specifically exemplified. However, a peptide comprising F at the P<sub>1</sub> position (SEQ ID NO:118) was tested and found to be cleaved by aspartyl protease, albeit less efficiently than the highly active Swedish mutant sequence (see text spanning pages 15-16). Furthermore, a number of different peptides were tested wherein P<sub>1</sub> is Y, an amino acid residue that is structurally similar to F and differs from F by only a single hydroxyl group, and each of these peptides were shown to be functional (*e.g.*, SEQ ID NOs:43, 5, 7 and 46). Thus, the skilled artisan would clearly recognize that the application supported the claimed genus of peptides including peptides wherein F is in the P<sub>1</sub> position.

The references cited by the Examiner further support the sufficiency of the teachings in the application. Specifically, in Shi *et al.* (2005) three additional substrates of the claimed genus (NFDV, NFEV and NLDV) are demonstrated to be cleaved more efficiently than wild type APP, one of which is cleaved at 10 fold greater efficiency. In particular, Shi demonstrates that peptides comprising an F at the P<sub>1</sub> position are cleaved very efficiently (see, *e.g.*, figure 2 on page 143). See also U.S. Patent No. 7,132,401 (Table 3), PCT Publication No. WO 02/094985 (page 41, lines 19-25) and PCT Publication No. WO 03/072041. Based on the evidence of record that eight of the nine peptide sequences of the claim are cleaved, it was clear error to maintain the written description rejection.

Although the Examiner himself relies on post-filing date art to challenge patentability, the Examiner finds “unpersuasive” the evidence identified *by the Applicants* in post-filing date art that the claimed genus is operative: “Applicants must show at the time of filing that they were in possession of the claimed invention, not wait to see what others have discovered and selectively trim their own genus down . . . .” The Examiner misunderstands the purpose of Applicant’s evidence or confuses the question of “possession” with the question of operability. The excerpts of the application identified above establish, incontrovertibly, that the Applicants *were in possession* of the claimed genus. The post-filing date evidence is relied upon solely to further establish that the claimed genus is operative, and the Patent Office’s reviewing court has sanctioned the use of post-filing date evidence for this purpose. See, e.g., *Gould v. Quigg*, 3 USPQ2d 1302, 1305 (Fed. Cir. 1987) (“In this case, the later dated publication was not offered as evidence [to supplement an insufficient disclosure]. Rather, it was offered as evidence . . . that the disclosed device was operative. . . . ‘Whether or not an invention would be deemed operative by one of ordinary skill in the art is determined, not at the time the invention was made but rather (at the earliest) at the time of the examiner’s call for proof.’” (citing *In re Pottier*, 153 USPQ 407 (CCPA 1967) Other citations omitted.)

### **3. The Examiner erred by alleging that literature supported a rejection.**

To allegedly demonstrate an insufficiency in the teachings of the application, the Examiner cited Gruninger-Leitch *et al.* (2002), Majer *et al.* (1997), Sauder *et al.* 2000, Shi *et al.* (2005) and Tomasselli *et al.* (2003), and argued that these references show peptide substrates with a variety of substitutions show *decreased* cleavage by aspartic proteases and thereby demonstrate that the genus of substrate peptides are insufficiently defined in the instant application. However, the only substrate that satisfies the structural limitation of claim 84 that is demonstrated as inoperative is one mutant APP sequence (NFAV) from Shi (page 142, Table 2), and even this substrate falls outside the claims if it fails to satisfy the functional limitation of the claim. While some substrates of the cited references may be non-optimal, the references do not characterize any other substrate within the claims as inoperative. Moreover, it is not a function of the claims to specifically exclude possible inoperative embodiments. The Federal Circuit has stated:

Where there are a myriad of operative combinations, the inclusion of a few that are not operative need not invalidate a patent. The

patent's claims can be construed to exclude those inoperative combinations. Including such inoperative combinations within the scope of a claim does not constitute invalidating "overclaiming." *Atlas Powder Co. v. E. I. du Pont de Nemours & Co.*, 588 F. Supp. 1455, 221 U.S.P.Q. 426 (Tex. 1983).

In this case the claims explicitly exclude any inoperative embodiments. Nonetheless, a single inoperative peptide sequence amongst the 5 functional substrates demonstrated in the instant application and 3 further operative substrates confirmed by Shi do not constitute a significant number of inoperative embodiments. Thus, none of the references cited by the Examiner support the instant rejection.

The Examiner pointed to Table 1 of Gruninger-Leitch *et al.* to illustrate that a single change to the amino acid sequence of a substrate may result in a decrease in cleavage activity. However, all substrates set out in Table 1 of Gruninger-Leitch *et al.*, that were designed to be cleaved by the  $\beta$ -secretase enzyme, exhibited some activity. The inactive substrates were either designed to be cleaved by  $\alpha$ -secretase or renin, and are not encompassed by the claims.

The Examiner pointed to examples in Gruninger-Leitch *et al.* which demonstrate that a single point mutation at the P<sub>1'</sub> or P<sub>4</sub> of the Swedish mutant cleavage site results in a drop in the rate of cleavage. However, none of the substrate peptides cited in these arguments are encompassed by the claimed genus (*i.e.*, cited peptides comprise A at the P<sub>2'</sub> position). Also, it is unfair to assert that substrates cleaved at a lower efficiency do not support the claimed genus when this measured efficiency was determined by a comparison of cleavage of the highly efficient "Swedish mutation" substrate. Even the wild-type substrate has only 9% cleavage compared to the Swedish mutation, yet it can be used in assays. These cited documents further support the claimed genus with observations such as, "[t]he data presented above also indicates that BACE can accept a wide variety of peptidic substrate." (Gruninger-Leitch *et al.* page 4692, bottom of right column.) and "[t]he results of the present investigation further indicate that BACE1 can accept a wide variety of amino acid residues at the  $\beta$ -scissile-bond of its substrate both in vitro and in cells." (Shi *et al.* page 146, left column). The Applicants impeach the art cited by the Examiner in greater detail at pages 11-14 of the amendment filed in December, 2006.

The claims read on substrates that are longer than 6 amino acids. However, the Applicants teach in the application (as recognized by the Examiner and nicely explained

in their later-published paper by Tomasselli *et al.*) that additional amino acids appears to enhance the reactivity of  $\beta$ -secretase toward the recognition site. (*See* Tomasselli at p. 1009 and Table 1, for example.)

**E. Double Patenting Rejections Should be Withdrawn**

Claims 84, 85, 87-92 and 94-107 are provisionally rejected under 35 U.S.C. § 101 as claiming the same subject matter of co-pending application nos. 10/801,487, 10/801,493, 10/801,938, application no. 10/801,486 (now abandoned) and application no. 09/908,943 (now U.S. Patent No. 7,205,120). However, the claims in the cited applications and patent are not identical to the claims at issue. Thus, the provisional double patenting rejection is inappropriate and should be removed.

**F. Conclusion**

The Examiner is invited to contact the undersigned at the number provided with any questions.

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